Incinerating Toilets

What do you do when there is no way to repair an onsite system because of restricted space or other severe limitations? Many Boards of Health have recently inquired about alternative toilets that have no discharge. As you recall, in the past we devoted an entire issue to composting toilets. But these toilets, which must be designed to store compost for at least 2 years (310 CMR 15.289(3)(a)) are often larger than can be accommodated in tight situations. In this issue, we feature incinerating toilets (which gives new meaning to the expression “hot stuff”). Incinerating toilets should be considered in situations where all other standard options have been exhausted, and in which there is very limited area available for a leaching facility. Examples of such situations are barrier beaches, tiny lots near the shore, dune shacks, and living units on piers or docks. Approximately 600 electric and a fewer number of gas incinerating toilets have been installed in New England. But, before we get started, let’s start with the basics.

What is an Incinerating Toilet?

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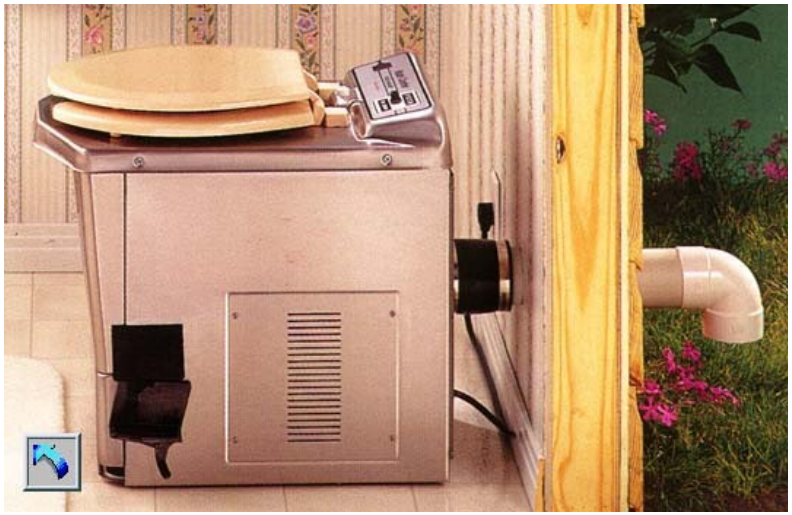

Figure 1 . Typical electric toilet installation by Incinolet®

Incinerating toilets are self contained waterless systems that do not require being hooked-up to a sewer system or inground septic system (except to dispose of graywater). They rely on electric power or natural or propane gas to incinerate human waste to sterile clean ash. When properly installed these systems are simple to use, safe, clean and relatively easy to maintain. Figure 1 shows a typical configuration of an electric toilet, and Figure 2 shows a schemata of a typical gas toilet installation.

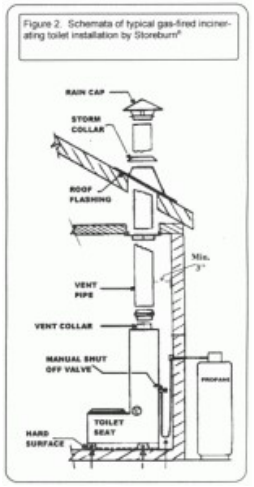

Figure 2. Schemata of typical gas-fired incinerating toilet installation by Storeburn®

These waterless systems look much like a standard household toilet. Between the gas and electric incinerating toilets there are some mechanical and operational differences, but the overall treatment processes work the same. Both systems accept human waste, both solid and liquid, into a burn chamber. The burn chamber reaches temperatures of 970-1400 oF and reduces human waste into clean sterile ash.

The Electric Toilet

The electric toilet is relatively easy to install. Because the system doesn't require water there is no need for a plumbing connection. Setup involves placing the unit in the desired location, connecting a 3-inch diameter exhaust vent between the rear of the unit and the building's exterior, and plugging the unit into an electrical outlet (120 volts).

The electric toilet requires that a bowl liner be placed into the stainless steel toilet bowl before each use. The liner protects the bowl from human waste and the need for excessive, unpleasant cleaning. Waste is collected into the liner which drops through the hinged bowl into a lower holding/burn area when the foot pedal on the unit is depressed. The lower holding/burn area can accept a maximum of 2-4 "flushes" before incineration is necessary.

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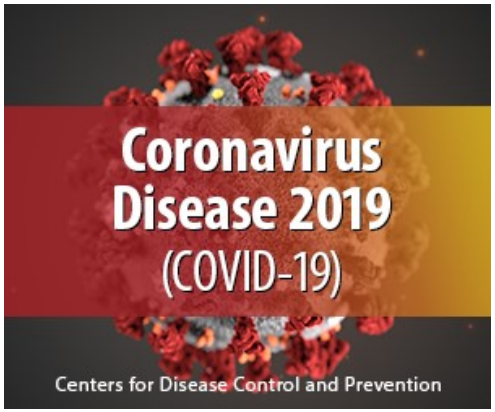

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After a “flush”, pressing the start button will begin the incineration cycle. Care must be taken that there is no paper or waste product protruding through the hinged bowl. This will prevent any burning or smoke outside of the chamber. The start button activates a heating coil to start the incineration process. The collected waste in the holding area is subjected to heat temperatures of up to 1400 oF for a pre-selected run time (about one hour). The heat and smoke within the incineration chamber is filtered through an odor control catalyst (much like the one found on a automobile exhaust system) and out the exhaust vent. The systems contains an exhaust blower which continues to extract heat after the heating coil has shut off and until the incineration chamber has cooled down to about 130 oF. Once the ash pan has cooled down to room temperature the incinerated debris, about a tablespoon, can be discarded. The process in summary is presented in Figure 3.

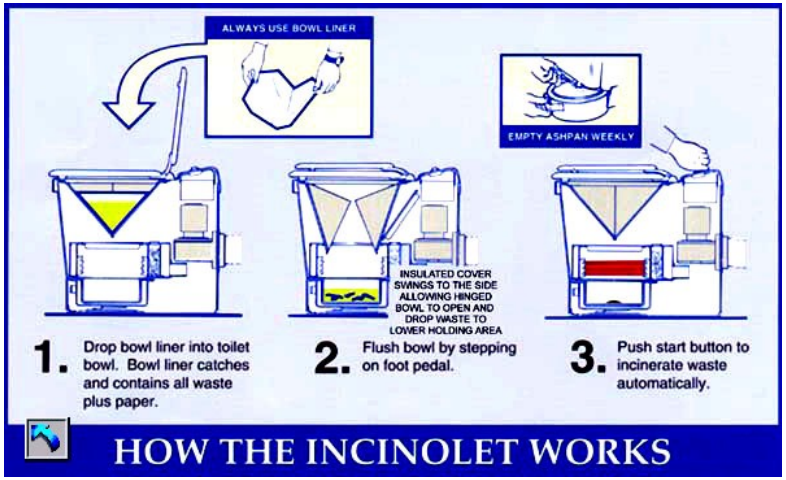

Figure 3. Electric Toilet Cycle

Over 175 electric toilets have been sold in Massachusetts by INCINOLET. These systems are in use in a number of locations on Cape Cod and the Islands (Bourne, Falmouth, Hyannis, Chatham and Nantucket). The price range of a unit is $1499-$1879, and the system cost about 28 Cents per cycle to operate. People and businesses using these systems indicated that they did not notice a power draw when the toilet was started or in use. Effects of the toilets’ electric demand were considered to be not noticeable to slightly noticeable. In two of the five people interviewed, odor from the system was considered a problem because they had not vented the system above their roof line. When their systems were in the incineration cycle they complained that there was a backdraft of odor/smell that was directly attributed to being vented too low. Both persons said that after the system had run for a while that smell became less noticeable. The differences in uses range from one to two incineration’s per weekend to a constant running use at a busy boat marina. People interviewed generally felt that the systems are easy to use, worked well and were fairly easy to maintain.

Incinolet is the only manufacturer of electric toilets that we have found. Product information and distribution details can be obtained by contacting RESEARCH PRODUCTS/Blankenship, 2639 Andjon, Dallas, Texas 75220. Phone 1-800-527-5551. WEB SITE http://www.dfw.net

Natural Gas and Propane Incinerating Toilets

Natural Gas and Propane incinerating toilets do not rely on the use of water, plumbing or electricity. These systems can be installed any place where a natural gas or propane source is available. The systems can be temporarily connected to propane gas cylinders like those used on gas grills, or can be directly hooked up to a permanent source of gas. According to the only manufacturer located (Storeburn®), these systems have the ability to accommodate the needs of 8 to 10 workers in an average 8 to 10 hour day or about 6 to 8 persons in a cottage or residence where the daily use would be about 16 hours.

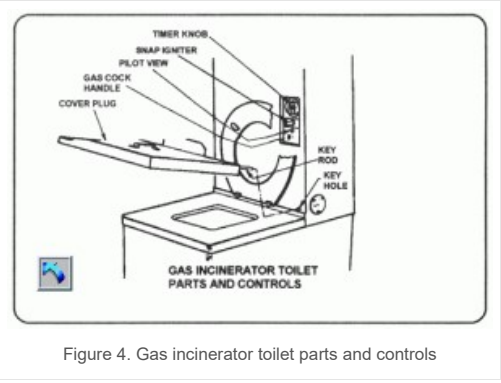

Figure 4. Gas incinerator toilet parts and controls

The gas powered incinerating toilets do not contain a toilet bowl. In appearance, they are more like a portable outhouse where the waste is dropped into a holding area/chamber. The holding chamber is located directly below the toilet seat. An aerosol masking foam may be applied after each use to blanket or cover over stored waste deposits. When the system is full or an incineration cycle is ready to begin, a package of anti-foam MK-1 is added to the liquid portion of the waste. The unit must not be operated without the MK-1. The toilet seat is lifted and a cover plug is inserted over the chamber opening (this plug acts as the firewall). The timer is set to the recommended setting according to load capacity. A gas cock handle is turned to the pilot position and ignited by pressing a button. Once the pilot light is on the main burner can be activated by turning the gas cock handle to the “ON” position. The system is then in the incineration cycle. Depending on the load capacity the system may burn for 1.5 to 4 hours. The manufacture recommends burning off the loads at times when the toilet will not have to be used such as at the end of the workday or at night. While this may work well for construction sites or weekend camps, it may present convenience problems for full-time living use.

Gas incinerator toilets require more installation considerations than electric toilets. Gas fixtures should be inspected annually for integrity. Venting of gas systems must be observed with the utmost care. An air space must be maintained under the bottom of the unit to assure proper drafting/airflow during an incineration cycle. Rugs and carpets should not be installed under the unit. The unit may not be installed in a airtight room and a provision for “make-up air” must be made. Intake air vents may be necessary if the toilet is to be located in an enclosed room.

People who are using the gas systems describe them as being similar to using a port-a-potty without the liquid chemical content. For this review, we interviewed two users, each of whom could be described as using the units limited amounts of time each year (one during the summer on weekends, the other was used for ice fishing 1-3 days per week during the winter). Both systems were run on propane gas. The systems were considered easy to use and to maintain. One person described the system as being the cross between an “outhouse and a gas fireplace” which, functionally speaking isn’t too far off.

One interesting system drawback was described as being “psychological”. People who are not acclimated to using waterless toilets may be uncomfortable with these systems. Interviews identified that some people had problems with the actual sounds of using a waterless system, the open pit or chamber below the seat, and having to use a

covering foam (they didn't care for having to look into the holding chamber). As with electric toilets, venting location is critical for proper odor control. Another recommendation was to have a spare spark igniter on hand in the event that the primary igniter fails. The spark igniter was considered easy to install and being much like the one on your home gas grill. Storburn® units cost in the range of $2,200, not including the necessary venting (approximately $150-$200). In addition, aerosol masking foam and antifoam are continuing costs. We could not estimate the operating costs of the unit based on the limited interviews.

Storburn® has a head office STORBURN INTERNATIONAL, INC., located at 9 Woodslee, Paris, Ontario N3L3T6, Telephone 1-800-876-2286. I also recently found out from a WEB site (www. jademountain. com/comp.html) that the Storburn® factory recently burned down (somewhat ironic) and it is uncertain at this point when or if they will be available again.

Where and When Should Incinerating Toilets be Installed?

If installed in accordance with appropriate codes (gas-fitting, plumbing, electric, building), both gas-fired and electric toilets are permitted in Massachusetts. It is not clear, however, if their use fulfills the requirement of a water closet under the plumbing code. Many of you may remember that the issue of a water- closet requirement prevented the use of composting toilets for years.

Boards of Health in Barnstable County and most areas of the state should only consider permitting the use of incinerator toilets as a replacement for a subsurface sewage system after careful consideration and after all other feasible alternatives have been explored. These units are not specifically referenced in Title 5, and hence there are no specific guidelines for their application. In general, they have been permitted in remedial situations where the living units are seasonal with limited use, and where there is a means for gray water disposal. Most often, graywater disposal in those situations is permitted to an existing facility in similar fashion as has been allowed under 310CMR 15.289(3)(a).

Incinerating toilets find their most ideal application at sites where it is impractical to extend water service or sites which receive very limited use. In the case of gas-fired incinerator toilets, even electrical service is not required. Applications include camps, cabins, fishing shacks, dune shacks, accessory buildings etc. Applications in Falmouth included beach cabanas along Shore Rd. that were heavily damaged during a hurricane.